

## CLAIMS:

1. A wireless telephone handset comprising:

an antenna connection;

a diplexer coupled to the antenna connection;

5 a transmit section connected to a first port of the diplexer;

a receive section connected to a second port of the diplexer; and

wherein the diplexer includes first and second notch filters, each of the notch filters comprising a main transmission line, a first coupling mechanism, and a first electrically tunable resonator coupled to the main transmission line through the first coupling mechanism.

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2. A wireless telephone handset according to claim 1, wherein each of the first electrically tunable resonators includes a first tunable dielectric varactor or a first microelectromechanical variable capacitor.

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3. A wireless telephone handset according to claim 2, wherein the first tunable varactor comprises:

a substrate having a first dielectric constant and having a generally planar surface;

20 a tunable dielectric layer positioned on the generally planar surface of the substrate, the tunable dielectric layer having a second dielectric constant greater than said first dielectric constant; and

first and second electrodes positioned on a surface of the tunable dielectric layer opposite the generally planar surface of the substrate, said first and second electrodes being separated to form a gap therebetween.

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4. A wireless telephone handset according to claim 1, wherein the first coupling mechanism comprises one of:

a first capacitive probe, a first inductive loop, a first iris window, a first evanescent waveguide piece, a first slot, and a first hole.

5. A wireless telephone handset according to claim 1, wherein the main transmission line comprises one of:

a coaxial transmission line, a microstrip line, a stripline line, a rectangular waveguide, a coplanar waveguide, and a ridged waveguide.

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6. A wireless telephone handset according to claim 1, wherein each of the first and second notch filters further includes:

a second coupling mechanism; and

10 a second electrically tunable resonator coupled to the main transmission line through the second coupling mechanism, wherein the first and second coupling mechanisms are spaced  $\frac{1}{4}$  wavelength apart at an operating frequency of the filter.

7. A wireless telephone handset comprising:

an antenna connection;

15 a diplexer coupled to the antenna connection;

a transmit section connected to a first port of the diplexer;

a receive section connected to a second port of the diplexer; and

20 wherein the diplexer includes first and second notch filters, each of the notch filters comprising a bandpass filter connected between a termination and one of a circulator or a 3dB hybrid.